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13. ABSTRACT (Maximum 200 words)

The researchers have developed a variety of adapted orthogonal transforms for signal compression and analysis. These methods have been used successfully in sound and high resolution image compression and are currently being tested for their technological value. In parallel, thes best basis algorithm has been used by K. Sreenivasan for analysis of experimental turbulence data, and by M. Farge and V. Wickerhauser for the analysis of simulated two dimensional vorticity fields. This analysis permiits a more careful comparison between simulation and experiment by detecting subltle differences in structures. By extracting coherent structures in the flows it promises to permit efficient tracking of these structures. In particular, as a result of testing by the FBI and Scotland Yard, a variant of these algorithms has been chosen for as a standard for fingerprint image compression with an estimated initial saving to the FBI in storage hardware alone of $25,000,000. These methods are also being tested, in collaboration with Martin Marietta, for automatic target recognition.

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R. Coifman, in collaboration with V. Wickerhauser, has developed a variety of adapted orthogonal transforms for signal compression and analysis. These methods have been used successfully in sound and high resolution image compression and are currently being tested for their technological value.

In parallel, the best basis algorithm has been used by K. Sreenivasan for analysis of experimental turbulence data, and by M. Farge and V. Wickerhauser for the analysis of simulated two dimensional vorticity fields. This analysis permits a more careful comparison between simulation and experiment by detecting subtle differences in structures. By extracting coherent structures in the flows it promises to permit efficient tracking of these structures. In particular, as a result of testing by the FBI and Scotland Yard, a variant of these algorithms has been chosen as a standard for fingerprint image compression (with an estimated initial saving to the FBI in storage hardware alone of $25,000,000).

These methods are also being tested, in collaboration with Martin Marietta, for automatic target recognition. The detailed properties of frequency localization of wavelet packets have been understood, indicating some loss of localization for high sequency numbers, see ref. To circumvent these limitations Meyer and Coifman have constructed localized trigonometric orthogonal bases. These new libraries of o.n bases can be used in conjunction with the best basis algorithm to provide good parameter extraction and compression methods. These are being tested and compared to other methods now.

In particular, the local trigonometric bases are ideally suited for fast computational tasks involving oscillatory problems such as solution of acoustic and electromagnetic scattering. Software for testing these methods has been developed by Fang, who also showed their efficiency as numerical tools.

Software permitting testing and evaluations of the tools mentioned above is being developed in a variety of formats and configurations and is being made availably by ftp.

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